

OCCASIONAL PAPERS



Museum of Texas Tech University

Number 248

13 January 2006

FISHES OF INDEPENDENCE CREEK AND PECOS RIVER

ROYAL D. SUTTKUS AND CLYDE JONES

ABSTRACT

This paper presents a comprehensive report on fishes collected from Independence Creek and the confluence area of the Pecos River from 11 June 1954 to and including 3 March 1976. Collections from Independence Creek were made with a small seine and those collections from the Pecos River were made with a small seine, two sizes of trammel nets, and two sizes of gill nets. The total of 29 collections at the Joe Chandler Ranch area resulted in 19,474 fish specimens which represented 37 species.

Collection data are given for each of the 29 samples and include stream name, field number, date of collection, number of species in sample, number of specimens in sample, and total listing of species in sample.

A listing of species, frequency of occurrence of each species in the 29 samples, total specimens of each species, and percent relative abundance are presented in Appendix.

INTRODUCTION

After reading Charlena Chandler's book titled, "On Independence Creek" The Story of a Texas Ranch," we decided to elaborate on our experiences in the area. We studied plants, fishes, amphibians, reptiles, birds, and mammals. This paper will focus primarily on fishes.

The late Fred R. Cagle's student, Robert E. Gordon, obtained our first fish collection from Independence Creek in 1954. This was followed by two collections made in 1961. The collection from Independence Creek in 1961 was taken by Knopf, Griffin, Hahn, and Voss and the other, a collection from the Pecos River, was obtained by Gerald and Tinkle.

One of us (RDS) was awarded an Environmental Biology Training Grant by the National Institute of Health (1963-68). That grant gave Suttikus and Jones an opportunity to work together in the field, and together with Glenn H. Clemmer, a Tulane University student, we made a number of reconnaissance trips prior to each summer program. Except for 1967, Joe Chandler's ranch was a major study area. Joe Chandler was most cooperative and allowed us great latitude in our collecting activities. Our Environmental Biology summer classes were composed of eight graduate students from various parts of the country, such as New York, Massachusetts, Michigan, California, Texas, etc., and each summer we had a different group. Each

summer session was two months in duration and we camped out in Quonset tents. We spent one month (June) in the eastern United States, usually Florida, Georgia, Alabama, and Mississippi and then in July the activities were centered in Texas and New Mexico and thus our collecting and studying activities in the Chandler ranch area were mostly during the month of July. The Environmental Biology Class obtained 22 collections of fishes from Chandler ranch area during

1963-66, 1968. Suttkus and Lyn Branch obtained a fish collection from Independence Creek on 25 August 1974; Suttkus and Alice and Anthony Echelle obtained a collection at the same place on 14 February 1976; and Suttkus and Cindy Prehmus obtained two collections of fishes on 3 March 1976.

The primary purpose of this paper is to present our fish collection data in its entirety.

MATERIALS AND METHODS

Fishes collected from Independence Creek were taken with a 10' (3.05 m) long by 6' (1.83 m) deep nylon minnow seine with a 3/16" (1.59 mm) mesh. One sample was taken from Independence Creek at Hwy. 349 crossing and the rest were taken from the lower stretch just above confluence with the Pecos River. Independence Creek flow sank into the gravel bed before its confluence with the Pecos River on 15 July 1963. The Pecos River was sampled with a 10' seine, 2" and 3" bar trammel, and 1.5" and 2" bar gill nets. The latter gear was not mentioned in Hoagstrom (2003) as having been used by Suttkus.

Collection dates extended from 11 June 1952 to and including 3 March 1976. A total of 29 collections of fishes were taken from Independence Creek and the Pecos River at Chandler ranch, Terrell County, Texas area.

Collection data are given for each of the 29 samples and include stream name, field number, date of collection, number of species in sample, number of specimens in sample, and total listing of species in sample. Families are arranged in phylogenetic order and species are arranged in alphabetical within families as given in the 2004 scientific and common names checklist (Nelson et al. 2004).

RESULTS AND DISCUSSION

The total of 29 collections from Independence Creek and Pecos River at the Chandler ranch resulted in 19,474 specimens which represented 37 species. A listing of species, frequency of occurrence of each species in the 29 samples, total specimens of each species, and percent relative abundance are presented in Appendix. Percent relative abundance is carried out to the nearest one hundredth of a percent for ease of comparison with relative abundance figures in Bonner et al. (2005).

Cyprinella lutrensis was the most abundant species in our samples with a total of 5,902 specimens and a relative abundance of 30.30%. *Dionda episcopa* was the next most abundant species with 5,039 specimens and a relative abundance of 25.87%. *Cyprinella proserpina* was the third most abundant species with 2,156 specimens and a relative abundance of 11.07%.

Cichlasoma cyanoguttatum occurred in 23 of the 29 samples with 387 specimens and a relative abundance of 1.99%. Both *Cyprinella lutrensis* and *Dionda episcopa* had the next highest frequency of occurrence and occurred in 22 of the 29 samples. *Cyprinella proserpina* occurred in 20 of the 29 samples.

We did not have equal distribution of our samples amongst the calendar months. No samples were taken January; February - 2 collections; March - 3 collections; April - 1 collection; June - 1 collection; July - 19 collections; and August - 3 collections.

Rhodes and Hubbs (1992), Hoagstrom (2003), and Bonner et al. (2005) did not include discussions with regards to fish sample composition and water temperature. Temperatures ranged from 22f to 28fC in Independence Creek during our July sampling.

Etheostoma grahami was absent in Independence Creek samples from 17 July 1963 to 15 August 1968. Three *E. grahami* were collected from Independence Creek on 25 August 1974 when water temperature was 25°C; 45 *E. grahami* were taken on 14 February 1976; none were taken in the early sample on 3 March 1976 when water temperature was 17.5°C but in the later sample on 3 March 1976, 43 *E. grahami* were taken at mouth of Independence Creek when the water temperature was 20°C. Years of experience in collecting in eastern and western streams have documented that 20°C is essentially the upper tolerance limit for many darters, and many, if not most darters spawn at temperatures well below 20°C.

Seasonally there is movement of some fishes from the Pecos River into Independence Creek and then with the advent of summer temperatures they retreat to the river. Certainly, we agree that fishes from Independence Creek reinvaded the Pecos River after it was decimated by a red tide (Rhodes and Hubbs 1992).

We agree that Karges (2003) should consider the initiation of an aggressive saltcedar eradication campaign and reduction of the native false willow, *Baccharis neglecta*, from the riparian areas along Independence Creek. However, such eradication will likely promote excessive bank erosion, especially during flash floods. Moreover, summer water temperatures will often increase with removal of vegetation. For example, we found the best place to collect *Ictalurus lupus* was an undercut bank beneath a thick stand of *Baccharis*. Besides the benefit of the shelter the water temperature was one or more degrees centigrade lower than out in the open midstream.

Although we are opposed to exotic invaders, such as *Tamarix*, we found that the long lasting flowering of saltcedar in the Grand Canyon attracted multitudes of insects and in turn vesperilionid bats (Jones et al. 1982). Removal of riparian vegetation is a short term fix for irrigation, grazing pasture, and the like, but is a sure path toward the destruction of the natural aquatic system.

Collections from Independence Creek and Pecos River at the Chandler Ranch, 17.5 air miles (45 km) SSE of Sheffield, Texas, Terrell Co., Texas.

1. Independence Creek, REG 254, 11 June 1954; 11 species, 138 specimens. Species: *Lepisosteus osseus*, *Cyprinella lutrensis*, *C. proserpina*, *Dionda episcopa*, *Notropis braytoni*, *Ictalurus* sp., *Fundulus zebrinus*, *Lucania parva*, *Gambusia affinis*, *Lepomis megalotis*, and *Cichlasoma cyanoguttatum*.

2. Independence Creek, Z39750, 4 February 1961; 8 species, 207 specimens. Species: *Cyprinella lutrensis*, *Dionda episcopa*, *Ictalurus lupus*, *Fundulus zebrinus*, *Gambusia affinis*, *Lepomis megalotis*, *Etheostoma grahami*, and *Cichlasoma cyanoguttatum*.

3. Independence Creek, Z 39925, 15 April 1961; 8 species, 228 specimens. Species: *Cyprinella lutrensis*, *C. proserpina*, *Dionda episcopa*, *Notropis stramineus*, *Astyanax mexicanus*, *Fundulus zebrinus*, *Gambusia affinis*, and *Cichlasoma cyanoguttatum*.

4. Independence Creek, KUR 61, 12 July 1963; 13 species, 169 specimens. Species: *Cyprinella lutrensis*, *C. proserpina*, *Dionda episcopa*, *Notropis amabilis*, *N. braytoni*, *Astyanax mexicanus*, *Ictalurus lupus*, *Fundulus zebrinus*, *Gambusia affinis*, *Lepomis cyanellus*, *L. megalotis*, *Etheostoma grahami*, and *Cichlasoma cyanoguttatum*.

5. Independence Creek, RDS 3303, 15 July 1963; 12 species, 276 specimens. Species: *Cyprinella lutrensis*, *C. proserpina*, *Dionda episcopa*, *Notropis amabilis*, *Astyanax mexicanus*, *Ictalurus lupus*, *Fundulus zebrinus*, *Gambusia affinis*, *Lepomis cyanellus*, *L. megalotis*, *Etheostoma grahami*, and *Cichlasoma cyanoguttatum*.

6. Pecos River, RDS 3304, 16 July 1963; 8 species, 124 specimens. Species: *Dorosoma cepedianum*, *Cyprinus carpio*, *Capiodes carpio*, *Ictiobus bubalus*, *Moxostoma congestum*, *Ictalurus lupus*, *Pylodictis olivaris*, *Micropterus salmoides*, and *Cichlasoma cyanoguttatum*.

7. Spring fed pond, RDS 3305, 16 July 1963; 3 species, 115 specimens. Species: *Gambusia affinis*, *Lepomis gulosus*, and *Cichlasoma cyanoguttatum*.

8. Pecos River, RDS 3306, 17 July 1963; 2 species, 11 specimens. Species: *Cyprinus carpio* and *Ictiobus bubalus*.

9. Independence Creek, RDS 3307, 17 July 1963; 12 species, 682 specimens. Species: *Cyprinella lutrensis*, *C. proserpina*, *Dionda episcopa*, *Notropis amabilis*, *Astyanax mexicanus*, *Ictalurus lupus*, *Fundulus zebrinus*, *Gambusia affinis*, *Lepomis cyanellus*, *L. megalotis*, *Etheostoma grahami*, and *Cichlasoma cyanoguttatum*.

10. Independence Creek, RDS 3308, 17 July 1963; 9 species, 386 specimens. Species: *Cyprinella lutrensis*, *C. proserpina*, *Dionda episcopa*, *Astyanax mexicanus*, *Ictalurus lupus*, *Gambusia affinis*, *Lepomis cyanellus*, *L. megalotis*, and *Cichlasoma cyanoguttatum*.

11. Independence Creek, RDS 3542, 19 July 1964; 19 species, 1475 specimens. Species: *Cyprinella lutrensis*, *C. prosperina*, *Cyprinus carpio*, *Dionda episcopa*, *Macrhybopsis aestivalis*, *Notropis amabilis*, *N. braytoni*, *Pimephales vigilax*, *Carpiodes carpio*, *Moxostoma congestum*, *Astyanax mexicanus*, *Ictalurus lupus*, *Fundulus zebrinus*, *Gambusia affinis*, *Lepomis auritus*, *L. cyanellus*, *Micropterus salmoides*, *Etheostoma lepidum*, and *Cichlasoma cyanoguttatum*.

12. Pecos River, RDS 3544, 20 July 1964; 6 species, 100 specimens. Species: *Dorosoma cepedianum*, *Cyprinus carpio*, *Carpiodes carpio*, *Moxostoma congestum*, *Pylodictis olivaris*, and *Micropterus salmoides*.

13. Independence Creek, RDS 3543, 20 July 1964; 11 species, 154 specimens. Species: *Cyprinella lutrensis*, *C. prosperina*, *Dionda episcopa*, *Astyanax mexicanus*, *Ictalurus lupus*, *Fundulus zebrinus*, *Gambusia affinis*, *Lepomis auritus*, *L. cyanellus*, *Etheostoma lepidum*, and *Cichlasoma cyanoguttatum*.

14. Independence Creek, RDS 3545, 21 July 1964; 11 species, 233 specimens. Species: *Cyprinella lutrensis*, *C. proserpina*, *Cyprinus carpio*, *Dionda episcopa*, *Notropis amabilis*, *Astyanax mexicanus*, *Ictalurus lupus*, *Lepomis auritus*, *L. megalotis*, *Micropterus salmoides*, and *Cichlasoma cyanoguttatum*.

15. Independence Creek, RDS, 21 July 1964; 7 species, 146 specimens. Species: *Cyprinella lutrensis*,

C. proserpina, *Dionda episcopa*, *Notropis amabilis*, *Astyanax mexicanus*, *Ictalurus lupus*, *Lepomis auritus*, *L. megalotis*, *Micropterus salmoides*, and *Cichlasoma cyanoguttatum*.

16. Independence Creek, RDS 3726, 11 July 1965; 12 species, 800 specimens. Species: *Cyprinella lutrensis*, *C. proserpina*, *Cyprinus carpio*, *Dionda episcopa*, *Notropis amabilis*, *Astyanax mexicanus*, *Ictalurus lupus*, *Fundulus zebrinus*, *Gambusia affinis*, *Lepomis megalotis*, *Micropterus salmoides*, and *Cichlasoma cyanoguttatum*.

17. Pecos River, RDS 3727, 12 July 1965; 4 species, 14 specimens. Species: *Dorosoma cepedianum*, *Cyprinus carpio*, *Carpiodes carpio*, and *Cycleptus elongatus*.

18. Pecos River, RDS 3727, 12 July 1965; 15 species, 740 specimens. Species: *Dorosoma cepedianum*, *Cyprinella lutrensis*, *C. proserpina*, *Dionda episcopa*, *Macrhybopsis aestivalis*, *Notropis amabilis*, *N. buchanani*, *Pimephales promelas*, *P. vigilax*, *Moxostoma congestum*, *Fundulus zebrinus*, *Gambusia affinis*, *Lepomis cyanellus*, *L. megalotis*, and *Cichlasoma cyanoguttatum*.

19. Pecos River, RDS 3728, 13 July 1965; 16 species, 2062 specimens. Species: *Cyprinella lutrensis*, *C. proserpina*, *C. venusta*, *Dionda episcopa*, *Macrhybopsis aestivalis*, *Notropis amabilis*, *N. braytoni*, *Pimephales promelas*, *P. vigilax*, *Astyanax mexicanus*, *Ictalurus lupus*, *Fundulus zebrinus*, *Gambusia affinis*, *Lepomis cyanellus*, *L. megalotis*, and *Cichlasoma cyanoguttatum*.

20. Independence Creek, RDS 3729, 13 July 1965; 9 species, 692 specimens. Species: *Cyprinella lutrensis*, *Dionda episcopa*, *Notropis amabilis*, *Astyanax mexicanus*, *Ictalurus lupus*, *Fundulus zebrinus*, *Gambusia affinis*, *Lepomis megalotis*, and *Cichlasoma cyanoguttatum*.

21. Pecos River, RDS 3731, 14 July 1965; 8 species, 35 specimens. Species: *Lepisosteus osseus*, *Dorosoma cepedianum*, *Cyprinus carpio*, *Carpiodes carpio*, *Moxostoma congestum*, *Pylodictis olivaris*, *Micropterus salmoides*, and *Cichlasoma cyanoguttatum*.

22. Independence Creek, RDS 3941, 12 July 1966; 14 species, 633 specimens. Species: *Cyprinella lutrensis*, *C. proserpina*, *Dionda episcopa*, *Macrhybopsis aestivalis*, *Notropis amabilis*, *N. braytoni*, *Pimephales vigilax*, *Carpionodes carpio*, *Astyanax mexicanus*, *Ictalurus lupus*, *Fundulus zebrinus*, *Gambusia affinis*, *Lepomis megalotis*, and *Cichlasoma cyanoguttatum*.

23. Independence Creek, KUR 404, 18 March 1968; 12 species, 394 specimens. Species: *Cyprinella lutrensis*, *C. proserpina*, *Dionda episcopa*, *Notropis amabilis*, *N. braytoni*, *Pimephales vigilax*, *Astyanax mexicanus*, *Ictalurus lupus*, *Fundulus zebrinus*, *Lucania parva*, *Gambusia affinis*, and *Lepomis megalotis*.

24. Pecos River, RDS 4401, 15 August 1968; 19 species, 1281 specimens. Species: *Cyprinella lutrensis*, *C. proserpina*, *C. venusta*, *Dionda episcopa*, *Macrhybopsis aestivalis*, *Notropis amabilis*, *N. braytoni*, *Pimephales promelas*, *P. vigilax*, *Carpionodes carpio*, *Moxostoma congestum*, *Astyanax mexicanus*, *Ictalurus lupus*, *Pylodictis olivaris*, *Gambusia affinis*, *Lepomis cyanellus*, *L. megalotis*, *Micropterus salmoides*, and *Cichlasoma cyanoguttatum*.

25. Independence Creek, RDS 4400, 15 August 1968; 16 species, 1293 specimens. Species: *Lepisosteus osseus*, *Cyprinella lutrensis*, *C. proserpina*, *C. venusta*, *Cyprinus carpio*, *Dionda episcopa*, *Notropis amabilis*, *N. braytoni*, *Astyanax mexicanus*, *Ictalurus lupus*, *Fundulus zebrinus*, *Lucania parva*, *Gambusia affinis*, *Lepomis cyanellus*, *L. megalotis*, and *Cichlasoma cyanoguttatum*.

26. Independence Creek, RDS 5738, 25 August 1974; 22 species, 3100 specimens. Species: *Dorosoma cepedianum*, *Cyprinella lutrensis*, *C. proserpina*, *C. venusta*, *Dionda episcopa*, *Macrhybopsis aestivalis*, *Notropis amabilis*, *N. braytoni*, *Pimephales vigilax*, *Moxostoma congestum*, *Astyanax mexicanus*, *Ictalurus lupus*, *Pylodictis olivaris*, *Menidia beryllina*, *Fundulus zebrinus*, *Lucania parva*, *Gambusia affinis*, *Lepomis cyanellus*, *L. megalotis*, *Micropterus salmoides*, *Etheostoma grahami*, and *Cichlasoma cyanoguttatum*.

27. Pecos River, RDS 6120, 14 February 1976; 17 species, 1061 specimens. Species: *Cyprinella lutrensis*, *C. proserpina*, *Dionda episcopa*, *Notemigonus crysoleucas*, *Notropis amabilis*, *N. braytoni*, *Pimephales vigilax*, *Astyanax mexicanus*, *Ictalurus lupus*, *Menidia beryllina*, *Fundulus zebrinus*, *Lucania parva*, *Gambusia affinis*, *G. geiseri*, *G. nobilis*, *Etheostoma grahami*, and *Cichlasoma cyanoguttatum*.

28. Independence Creek, RDS 6135, 3 March 1976; 1 species, 7 specimens. Species: *Moxostoma congestum*.

29. Pecos River, RDS 6136, 3 March 1976; 15 species, 2918 specimens. Species: *Cyprinella lutrensis*, *C. proserpina*, *Dionda episcopa*, *Macrhybopsis aestivalis*, *Notropis amabilis*, *N. braytoni*, *Pimephales promelas*, *P. vigilax*, *Astyanax mexicanus*, *Ictalurus lupus*, *Gambusia affinis*, *Lepomis cyanellus*, *L. megalotis*, *Etheostoma grahami*, and *Cichlasoma cyanoguttatum*.

LITERATURE CITED

- Bonner, T. H., C. Thomas, C. S. Williams, and J. P. Karges. 2005. Temporal assessment of a west Texas stream fish assemblage. *The Southwestern Naturalist* 50:74-78.
- Hoagstrom, C. W. 2003. Historical and recent fish fauna of the lower Pecos River. Pp. 91-109 in *Aquatic fauna of the Northern Chihuahuan Desert* (G. P. Garrett and N. L. Allen, eds.) Special Publications, The Museum, Texas Tech University 46:1-160.
- Jones, C., G. H. Clemmer, R. D. Suttkus, and R. D. Curnow. 1982. Distributional checklist of the mammals along the Colorado River in the Grand Canyon. Occasional Papers, Tulane University Museum Natural History.
- Karges, J. 2003. Aquatic conservation and the Nature Conservancy of West Texas. Pp. 141-150 in *Aquatic fauna of the Northern Chihuahuan Desert* (G. P. Garrett and N. L. Allen, eds.) Special Publications, The Museum, Texas Tech University 46:1-160.

- Nelson, J. S., E. J. Crossman, H. Espinosa-Perez, L. T. Findley, C. R. Gilbert, R. N. Lea, and J. D. Williams. 2004. Common and scientific names of fishes from the United States, Canada, and Mexico, Sixth Edition. American Fisheries Society Special Publication 29:1-386. Bethesda, Maryland.
- Rhodes, K. and C. Hubbs. 1992. Recovery of Pecos River fishes from a red tide fish kill. The Southwestern Naturalist 37:178-187.

Addresses of authors:

ROYAL D. SUTKUSS

Tulane University
Museum of Natural History
Belle Chasse, LA 70037

CLYDE JONES

Texas Tech University
Department of Biological Sciences and the Museum
Lubbock, TX 79409-3131

APPENDIX

Checklist of fishes collected from Independence Creek and nearby section of Pecos River, with frequency of occurrence, number of specimens, and percent relative abundance.

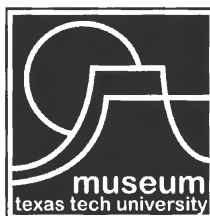
	Frequency of Occurrence	Numbers of Specimens	Percent Relative Abundance
Lepisosteidae-gars			
<i>Lepisosteus osseus</i> (Linnaeus 1758)-longnose gar	3	3	<0.02
Clupeidae-herrings			
<i>Dorosoma cepedianum</i> (Lesueur 1818)-gizzard shad	6	35	0.18
Cyprinidae-carps and minnows			
<i>Cyprinella lutrensis</i> (Baird and Girard 1853)-red shiner	22	5,902	30.30
<i>Cyprinella proserpina</i> (Girard 1856)-proserpine shiner	20	2,156	11.07
<i>Cyprinella venusta</i> Girard 1856-blacktail shiner	4	11	0.06
<i>Cyprinus carpio</i> Linnaeus 1758-common carp	9	27	0.14
<i>Dionda episcopa</i> Girard 1856-roundnose minnow	22	5,039	25.87
<i>Macrhybopsis aestivalis</i> (Girard 1856)-speckled chub	7	65	0.33
<i>Notemigonus crysoleucas</i> (Mitchill 1814)-golden shiner	1	2	0.01
<i>Notropis amabilis</i> (Girard 1856)-Texas shiner	17	1,026	5.27
<i>Notropis braytoni</i> Jordan and Evermann 1896-tamaulipas shiner	11	757	3.89
<i>Notropis buechanani</i> Meek 1896-ghost shiner	1	1	<0.01
<i>Notropis stramineus</i> (Cope 1865)-sand shiner	1	2	0.01
<i>Pimephales promelas</i> Rafinesque 1820-fathead minnow	4	22	0.11
<i>Pimephales vigilax</i> (Baird and Girard 1853)-bullhead minnow	9	290	1.49
Catastomidae-suckers			
<i>Carpionotus carpio</i> (Rafinesque 1820)-river carpsucker	7	169	0.87
<i>Cyprinotus elongatus</i> (Lesueur 1817)-blue sucker	1	1	<0.01
<i>Ictalurus nebulosus</i> (Rafinesque 1818)-smallmouth buffalo	2	6	0.03
<i>Moxostoma valenciennesi</i> (Baird and Girard 1854)-gray redbreast	8	72	0.37
Characidae-characins			
<i>Astyanax mexicanus</i> (De Filippi 1853)-Mexican tetra	19	349	1.79

Appendix I. (cont.)

Checklist of fishes collected from Independence Creek and nearby section of Pecos River, with frequency of occurrence, number of specimens, and percent relative abundance.	Frequency of Occurrence	Numbers of Specimens	Percent Relative Abundance
Ictaluridae-North American catfishes			
<i>Ictalurus sp.</i>	1	1	<0.01
<i>Ictalurus lupus</i> (Girard 1858)-headwater catfish	20	541	2.78
<i>Pylodictis olivaris</i> (Rafinesque 1818)-flathead catfish	5	6	0.03
Atherinopsidae-New World silversides			
<i>Menidia beryllina</i> (Cope 1867)-tidewater silverside	2	2	0.01
Fundulidae-topminnows			
<i>Fundulus zebrinus</i> Jordan and Gilbert 1883-plains killfish	17	394	2.02
<i>Lucania parva</i> (Baird and Girard 1855)-rainwater killfish	5	50	0.26
Poeciliidae-livebearers			
<i>Gambusia affinis</i> (Baird and Girard 1853)-western mosquitofish	21	1,784	9.16
<i>Gambusia geiseri</i> Hubbs and Hubbs 1957-largespring gambusia	1	5	0.02
<i>Gambusia nobilis</i> (Baird and Girard 1853)-Pecos gambusia	1	1	<0.01
Centrarchidae-sunfishes			
<i>Lepomis auritus</i> (Linnaeus 1758)-redbreast sunfish	3	12	0.06
<i>Lepomis cyanellus</i> Rafinesque 1819-green sunfish	12	42	0.22
<i>Lepomis gulosus</i> (Cuvier 1829)-warmouth	1	3	<0.02
<i>Lepomis megalotis</i> (Rafinesque 1820)-longear sunfish	18	161	0.83
<i>Micropterus salmoides</i> (Lacepède 1802)-largemouth bass	8	20	0.10
Percidae-perches			
<i>Etheostoma grahami</i> (Girard 1859)-Rio Grande darter	7	128	0.66
<i>Etheostoma lepidum</i> (Baird and Girard 1853)-greenthroat darter	2	2	0.01
Cichlidae-cichlids			
<i>Cichlasoma cyanoguttatum</i> (Baird and Girard 1854)-Rio Grande cichlid	23	387	1.99

PUBLICATIONS OF THE MUSEUM OF TEXAS TECH UNIVERSITY

Institutional subscriptions are available through the Museum of Texas Tech University, attn: NSRL Publications Secretary, Box 43191, Lubbock, TX 79409-3191. Individuals may also purchase separate numbers of the Occasional Papers directly from the Museum of Texas Tech University.



ISSN 0149-175X

Museum of Texas Tech University, Lubbock, TX 79409-3191